
OPERATOR REFERENCE GUIDE

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Mathematical Functions

Derived Functions

Functions that are not intrinsic to Microsoft BASIC may be calculated as follows.

<u>Function</u>	<u>Microsoft BASIC Equivalent</u>
SECANT	$\text{SEC}(X)=1/\text{COS}(X)$
COSECANT	$\text{CSC}(X)=1/\text{SIN}(X)$
COTANGENT	$\text{COT}(X)=1/\text{TAN}(X)$
INVERSE SINE	$\text{ARCSIN}(X)=\text{ATN}(X/\text{SQR}(-X*X+1))$
INVERSE COSINE	$\text{ARCCOS}(X)=-\text{ATN}(X/\text{SQR}(-X*X+1))+1.5708$
INVERSE SECANT	$\text{ARCSEC}(X)=\text{ATN}(X/\text{SQR}(X*X-1))$ $+ \text{SGN}(\text{SGN}(X)-1)*1.5708$
INVERSE COSECANT	$\text{ARCCSC}(X)=\text{ATN}(X/\text{SQR}(X*X-1))$ $+ (\text{SGN}(X)-1)*1.5708$
INVERSE COTANGENT	$\text{ARCCOT}(X)=\text{ATN}(X)+1.5708$
HYPERBOLIC SINE	$\text{SINH}(X)=(\text{EXP}(X)-\text{EXP}(-X))/2$
HYPERBOLIC COSINE	$\text{COSH}(X)=(\text{EXP}(X)+\text{EXP}(-X))/2$
HYPERBOLIC TANGENT	$\text{TANH}(X)=\text{EXP}(-X)/(\text{EXP}(X)+\text{EXP}(-X))*2+1$
HYPERBOLIC SECANT	$\text{SECH}(X)=2/(\text{EXP}(X)+\text{EXP}(-X))$
HYPERBOLIC COSECANT	$\text{CSCH}(X)=2/(\text{EXP}(X)-\text{EXP}(-X))$
HYPERBOLIC COTANGENT	$\text{COTH}(X)=\text{EXP}(-X)/(\text{EXP}(X)-\text{EXP}(-X))*2+1$
INVERSE HYPERBOLIC SINE	$\text{ARCSINH}(X)=\text{LOG}(X+\text{SQR}(X*X+1))$
INVERSE HYPERBOLIC COSINE	$\text{ARCCOSH}(X)=\text{LOG}(X+\text{SQR}(X*X-1))$
INVERSE HYPERBOLIC TANGENT	$\text{ARCTANH}(X)=\text{LOG}((1+X)/(1-X))/2$
INVERSE HYPERBOLIC SECANT	$\text{ARCSECH}(X)=\text{LOG}((\text{SQR}(-X*X+1)+1)/X)$
INVERSE HYPERBOLIC COSECANT	$\text{ARCCSCH}(X)=\text{LOG}((\text{SGN}(X)*\text{SQR}(X*X+1)+1)/X)$
INVERSE HYPERBOLIC COTANGENT	$\text{ARCCOTH}(X)=\text{LOG}((X+1)/(X-1))/2$

35

$$\begin{array}{r} 53 \\ 32 \\ \hline 21 \end{array}$$

$$\begin{array}{r} 56 \\ 32 \\ \hline 24 \end{array}$$

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For information on the MS-DOS Text Editor (EDLIN) and the CP/M-86 Text Editor (ED), refer to Addenda I and II.

PREFACE

Your computer is one of the most flexible, versatile, and powerful desktop computers in the world. From now on, you will get your work done faster and more easily than ever before. And you'll produce accurate, attractive results.

This Guide shows you how to use your computer. The information is presented in the order that you need it. Procedures are explained one at a time. Each new term is printed in bold type the first time it's used, and then precise definitions appear in the Glossary.

The introductory Section—Basic Procedures—includes information you need to begin using your computer for office work. You will learn how to set up your computer, how to load an operating system, how to work with diskettes, and how to use the basic keyboard (other keyboards are illustrated in Appendix D).

The next Section—The MS-DOS Operating System—describes the MS-DOS system structure, including the file system and special editing functions, the diskette management utilities available to you, and the internal commands. If you have a hard disk, refer to Appendix A for useful information including a brief discussion of the CP/M Emulator.

The third Section—The CP/M-86 Operating System—explains CP/M-86 capabilities and features. You will learn this system's components, input/output devices, operating principles, commands, and its file system. This Section also discusses basic operating procedures (including loading the system and changing diskettes), and device and media management.

The fourth Section is a brief discussion on how to solve any problems you may encounter. Most problems can be solved easily and quickly; and for your convenience, a list of error messages is included. You will find this section a handy reference tool.

The fifth Section consists of useful Appendixes. Appendix A is a discussion of the Hard Disk Operations (including CP/M Emulator) for those using the MS-DOS Operating System. Appendix B lists Display Driver Specifications, including the 132-Column utility. Appendixes C and D, respectively, illustrate the many character sets and keyboards available with your computer. (NOTE: The Programmer's Tool Kit contains utilities for generating both custom character sets and keyboards.) Finally, Appendix E discusses some of the peripheral software packages available to you—including the Programmer's Tool Kit, the Graphics Tool Kit, and Communications.

The final Section—the Glossary—consists of precise and clear definitions of important terms and concepts.

Following the Glossary, you will find information on the two Text Editors: EDLIN for MS-DOS, and ED for CP/M-86.

SETTING UP THE COMPUTER

This chapter describes how to install, plug in, and turn on your computer. If you have not yet unpacked your computer, look inside its box for unpacking instructions.

PARTS OF THE COMPUTER

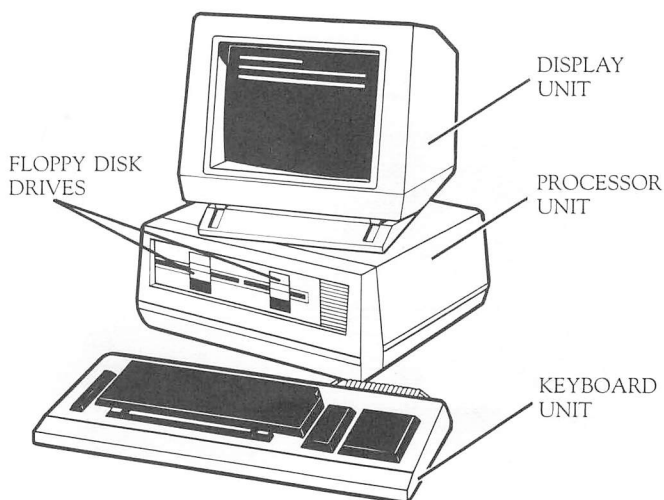
1.1

The parts of your computer are collectively called **hardware**. After you read this guide, you will know how to use every part.

Your computer is available in several different models. Each model contains three basic parts (Figure 1-1):

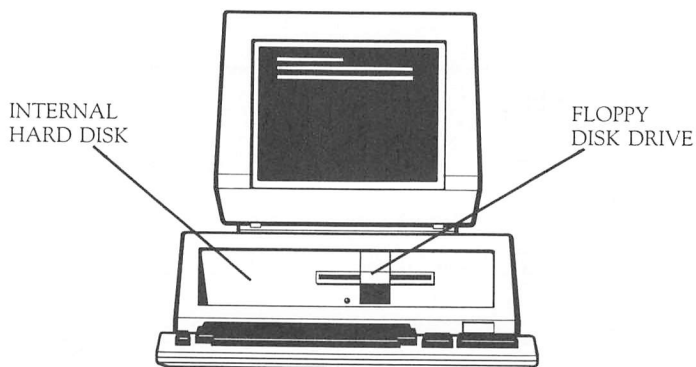
- ▶ The **keyboard**.
- ▶ The **display unit**
(also called the **CRT**).
- ▶ The **processor unit**.

1-1: Computer with Two Floppy Disk Drives

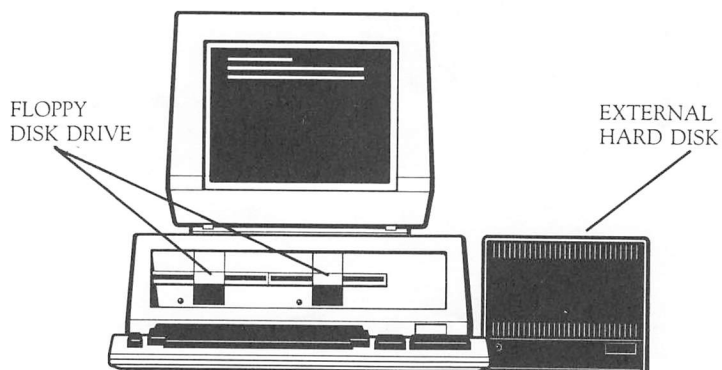


In addition, your computer may have an internal or external **hard disk** (Figures 1-2 and 1-3).

1-2: Computer with Internal Hard Disk



1-3: Computer with External Hard Disk

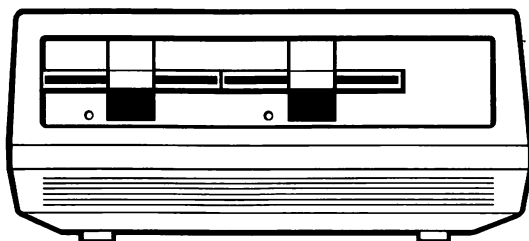


The processor unit for your model may have one or two **floppy disk drives**. Computers with an internal hard disk have only one floppy drive; computers with an external hard disk may have one or two floppy drives.

Floppy disk drives can be **single-sided** or **double-sided**:

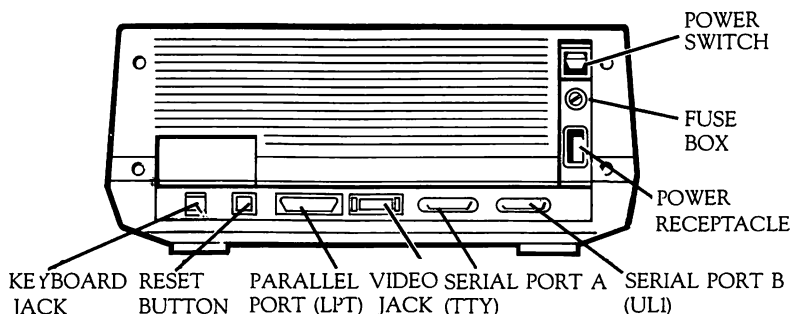
- ▶ Single-sided and double-sided drives look alike.
- ▶ Computers with an internal hard disk always have a double-sided drive.

1-4: Processor Unit with Single- or Double-sided Disk Drives



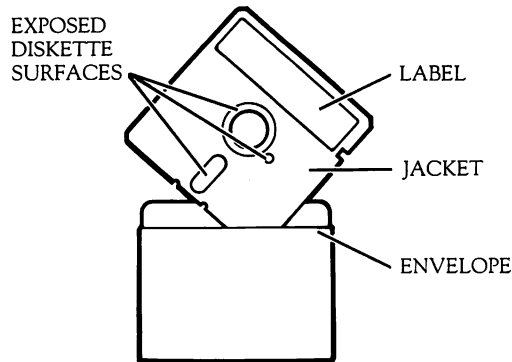
The back of the processor unit contains the power switch, power jacks, and other connectors and switches (Figure 1-5).

1-5: Processor Unit, Rear View



Another important part of the computer is the **floppy diskette**. Floppy diskettes and the hard disk are used to store the work that you do with the computer. Diskettes are called “floppy” because they are flexible—as opposed to the hard disk, which is rigid. Figure 1-6 shows the parts of a diskette.

1-6: Parts of a Diskette



Application programs are distributed on two types of floppy diskettes: single-sided and double-sided.

- ▶ Double-sided diskettes are used only with computers that have double-sided floppy disk drives.
 - ▶ Single-sided diskettes may be used with computers that have single- or double-sided floppy disk drives.
-

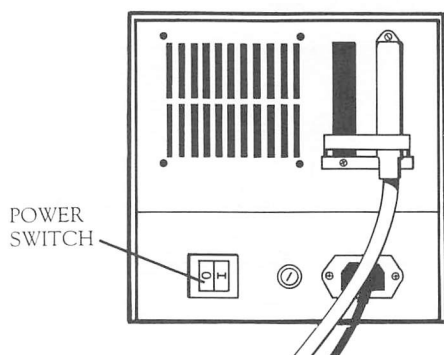
1.2 HOW TO INSTALL THE COMPUTER

CAUTION: Handle your computer with care. Be careful not to jar the hard disk or allow it to vibrate.

The following steps describe how to install and plug in your computer.

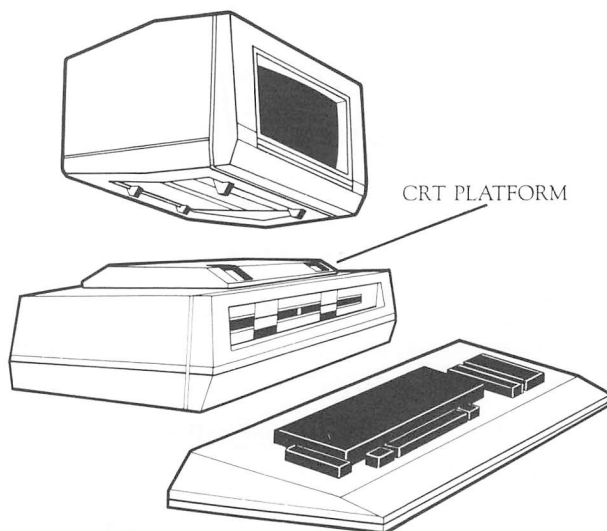
1. Turn off the main power switch (the 0 position; Figure 1-5). If you have an external hard disk, turn off the hard disk power switch (Figure 1-7).

1-7: External Hard Disk Power Switch



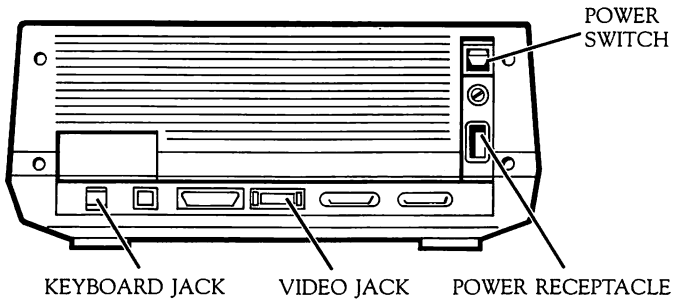
-
2. Place the CRT platform on the processor unit (Figure 1-8). The hole in the platform bottom fits over the peg in the middle of the processor.
 3. Place the CRT in the grooves on the platform.
-

1-8: Positioning Computer Units



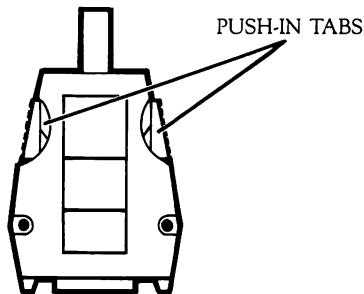
4. Plug the CRT cord into the video jack (Figure 1-9).

1-9: Processor Unit, Rear View



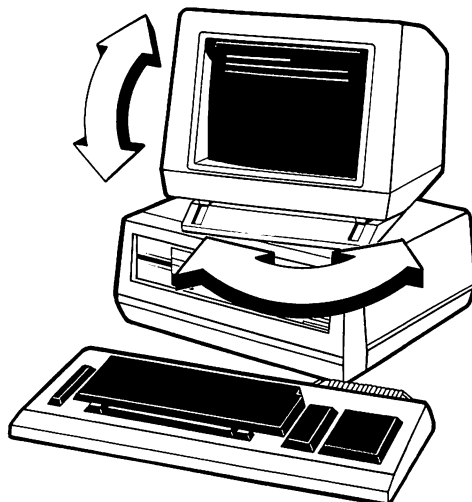
To disconnect the plug, press in the tabs on each side of the plug while pulling it out (Figure 1-10).

1-10: Display Unit Connector



-
5. Plug the keyboard cord into the keyboard jack (Figure 1-9). The cord can go around or under the processor unit.
 6. Plug the power cord into the power socket (Figure 1-9) and into a three-pronged outlet. Always use the computer power cord; other cords cannot be used safely.
 7. Adjust the CRT for easy viewing. Push it gently sideways and up and down (Figure 1-11).
 8. Place the keyboard anywhere within cord range. Your dealer can supply you with a longer keyboard cord if you need one.

1-11: Positioning the Display Unit



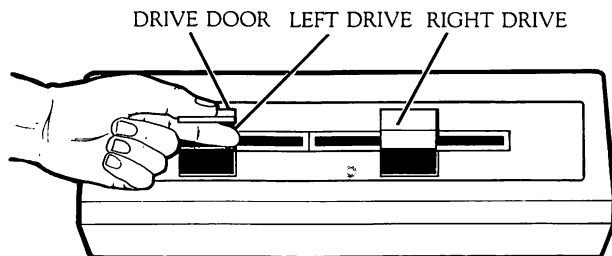
HOW TO TURN ON THE POWER

1.3

To turn on the power:

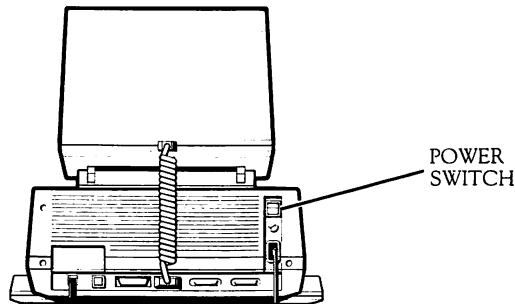
1. Open the floppy disk drive or drives:
 - ▶ A floppy disk drive is a slot on the front of the processor unit (Figure 1-1). Your computer may have one or two floppy drives.
 - ▶ Open the drives by gently lifting the drive doors (Figure 1-12).

1-12: Opening a Drive Door



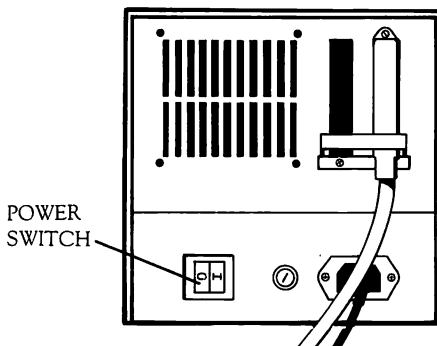
2. Make sure the drives are empty. Remove any cardboard packing material or floppy diskettes.
 3. Turn on the main power switch (the 1 position; Figure 1-13).
-

1-13: Power Switch



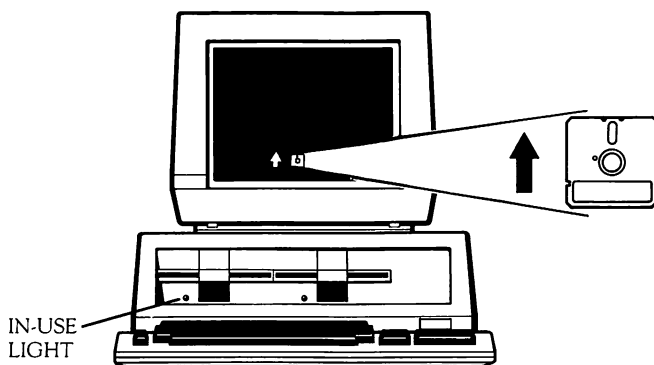
-
4. If you have an external hard disk, turn on its power switch (Figure 1-14).
-

1-14: External Hard Disk Power Switch



When you turn on the power, the computer displays its **power-on message** (Figure 1-15). This tells you to insert a diskette into the computer. Also, the red **in-use light** by the drive lights up, telling you to insert the diskette in the drive. Chapter 2 describes how to insert a diskette.

1-15: Power-On Display



If you have a hard disk, the computer may load the operating system when you turn on the power, rather than display the power-on message. Loading the operating system is described in Chapter 2.

HOW TO TURN OFF THE POWER

1.4

When you have finished using the computer:

1. Check that the red in-use light by each drive has turned off. The light must be **off** before you remove a diskette from the drive.
2. Remove all diskettes from the drives and store them safely.
3. Turn off the power switch for the external hard disk, if you have one.
4. Turn off the main power switch.

You do not need to turn off the power unless you are leaving your computer for a long time. But you should always remove and store your diskettes when you have finished using the computer.

LOADING THE OPERATING SYSTEM

The **disk operating system** (the **DOS**) tells the computer how to do basic functions—for example, what to display on the screen. The computer cannot function without the DOS.

The DOS consists of a list of instructions to the computer. These instructions are stored on the hard disk or on a floppy diskette. A floppy diskette that contains the DOS is called a **system diskette**.

Your computer can use several operating systems. The primary operating system supplied with your computer is MS-DOS. In some cases, CP/M-86 is also supplied.

NOTE: CP/M-86 is not supplied for computers with a hard disk. A CP/M-86 emulator is supplied to allow you to use CP/M-86 with the hard disk.

Each time you turn on the power, the computer transfers the DOS from the hard disk or system diskette into the processor unit. This is called **loading** or **booting** the system.

This chapter describes how to load your computer with MS-DOS. Some details differ if you use CP/M-86.

HOW TO LOAD THE OPERATING SYSTEM

2.1

You load the DOS with your system diskette. If your system includes a hard disk, you can also set up the hard disk to load the DOS automatically for you. You must use the HDSETUP computer program to do this. Appendix A describes how to use HDSETUP.

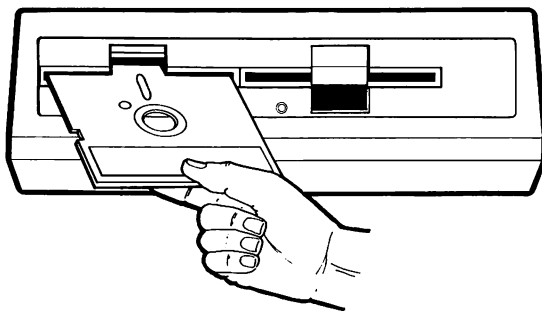
To load the DOS with your system diskette:

1. Make sure the power-on message is shown on the screen (Figure 1-13).
2. Remove the system diskette from its envelope. Hold the diskette by its label.

CAUTION: Handle diskettes carefully.

- ▶ Do not bend diskettes.
 - ▶ Do not touch the exposed surfaces.
 - ▶ Keep diskettes away from magnetic fields, such as those generated by magnetic paper clip holders or ringing telephones.
3. Insert the diskette — label side up and label edge last — into the left drive (Figure 2-1). Do not force the diskette. If it sticks, remove it and try again.

2-1: Inserting a Diskette



-
4. Gently but firmly close the drive door. DO NOT reopen the drive door until the DOS is loaded.

CAUTION: Handle floppy disk drives carefully:

- ▶ Do not stick anything other than a diskette into a drive.
- ▶ Open and close drive doors carefully.
- ▶ Never open a drive door when its in-use light is on or the drive motor is running.

The DOS loads in about 15 seconds. During that time, the **memory test message** appears. When the DOS is loaded, it shows its **sign-on message**. The following sections describe these messages.

Memory Test Message

2.1.1

The memory test message shows a clock symbol, the letter “M”, and a number.

The clock symbol asks you to wait. The letter M tells you the computer is testing its **memory**. The number indicates memory size.

Memory is information storage. It is measured in **bytes**; one byte contains one character of information, such as a letter or number. The number shown in the memory test message indicates memory size as follows:

<u>NUMBER</u>	<u>MEMORY SIZE</u>
2000	128K bytes (1K bytes is about 1000 bytes)
4000	256K bytes
8000	512K bytes
14000	896K bytes

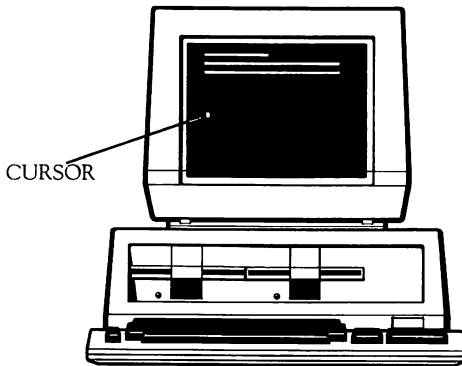
The letter M and the number appear so briefly you may not notice them the first time the DOS is loaded.

2.1.2 Sign-on Message

The **sign-on message** appears when the DOS is loaded (Figure 2-2). The sign-on message gives setup information about the DOS.

A request that you type the date is shown with the sign-on message. The **cursor** appears beside the request. The cursor's purpose is to show you where your next typed entry will appear.

2-2: Sign-On Message



2.2 HOW TO SET THE DATE AND TIME

The DOS keeps track of the date and time while you are using the computer. The DOS uses this information to date your work.

The DOS asks you to set the date and time after it is loaded. Always set the date and time correctly so that DOS can date your work accurately. In this way you will always know when you did what with the computer.

The DOS asks you to type the date:

- Do not type the name of the day when you change the date.

- ▶ The date may be typed in European format (day-month-year) by separating the numbers with hyphens.
- ▶ The date may be typed in American format (month/day/year) by separating the numbers with slashes.
- ▶ Press the Return key when done. The Return key is labeled RETURN or ↵.
- ▶ Don't worry about making mistakes:
 - Use the Backspace key to erase mistakes. The Backspace key is labeled BACKSPACE or ←.
 - If you make a mistake, the DOS asks you to retype the date.

The DOS then shows the time it is now set for and asks you to change the time.

NOTE:

- ▶ The DOS keeps a 24 hour clock. One o'clock pm, for example, is 13:00; 11 pm is 23:00.
- ▶ When the DOS shows the time, it shows the hour, minute, second—and half second.

To change the time:

- ▶ Do not type the half second.
- ▶ Separate the time with colons (hour:minute:second). The second colon and number for the second is optional.
- ▶ Press the Return key when done.
- ▶ Correct mistakes as when setting the date.
- ▶ If you don't want to change the time, press Return when asked to type the new time.

Once you have set the date and time, you can check (and change) them any time you are using the DOS:

- ▶ To check the date, type “date” and press Return.
- ▶ To check the time, type “time” and press Return.
- ▶ The DOS shows the date or time and asks you to reset it. Press Return to leave it as is.

After you set the date and time, the DOS shows its command prompt—or it shows its command prompt and loads the application program you are using. The following sections describe the command prompt and application programs.

2.3 THE COMMAND PROMPT

The DOS command prompt is a letter followed by >. For example:

A>

is a command prompt. The command prompt tells you the DOS is ready to accept a **command**—or an instruction—from you.

The DOS command prompt always means the DOS is loaded and ready to use.

2.4 APPLICATION PROGRAMS

The DOS and application programs are both computer **programs**. A program is a list of instructions to the computer to do certain jobs. The DOS performs the basic functions used by all other programs. Application programs perform tasks such as word processing or inventory control. The word “application” means that the program applies the computer to a particular job. Computer programs are collectively called **software**.

You must load an application program before you can use it. When you load the program, the computer transfers it from a diskette or hard disk into the processor unit.

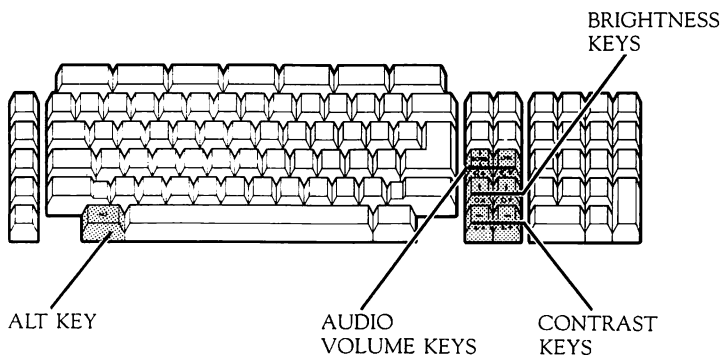
Some application programs are set up to be automatically loaded by the DOS. The DOS loads them after it displays its command prompt. You must load other application programs yourself. A program's user guide describes how to load it.

HOW TO ADJUST BRIGHTNESS, CONTRAST, AND VOLUME 2.5

You can adjust screen brightness, contrast, and audio volume any time after the DOS is loaded. Adjust the audio volume for application programs that use sounds—such as beeps or voice prompts—to communicate with you.

You adjust brightness, contrast, or audio volume by holding down the ALT key and pressing one of the keys shown in Figure 2-3.

2-3: Brightness/Contrast/Volume Keys and the ALT Key



Each brightness, contrast, or volume key has an appropriate symbol on its front key label. The label also shows an upward-pointing triangle (for “increase”) or a downward-pointing triangle (for “decrease”).

For example, the label on the front of the brightness-increase key has a sun symbol and a downward-pointing triangle.

You can practice adjusting the brightness:

- ▶ To increase brightness, hold down the ALT key and press the brightness-increase key one or more times.
- ▶ To decrease brightness, hold down the ALT key and press the brightness-decrease key one or more times.

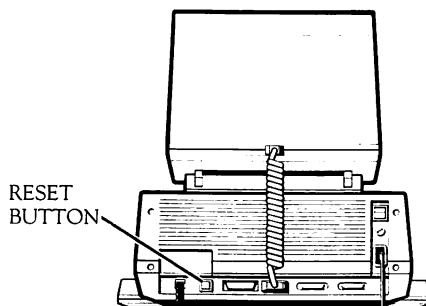
Use the contrast and volume keys in the same way.


2.6 HOW TO USE THE RESET BUTTON

The **reset button** is the square black button on the rear of the processor unit (Figure 2-4). When you press the reset button, the computer:

- ▶ Reloads the DOS if your system diskette is inserted.
 - ▶ Displays the power-on message (Figure 1-15) if the drives are empty and the drive doors are open.
-

2-4: Reset Button





If the drives are empty but one of the doors is closed, the computer displays an error message. Open the drive door to solve this problem. (Error messages are listed and described in Chapter 16.)

Use the reset button to load a new operating system, or to recover from a problem with the computer that cannot be corrected in another way.

2

CAUTION: The computer may destroy the work you were doing when you press the reset button. Do not use the reset button unless you have saved the work you are doing.

MAKING A BACKUP DISKETTE

The first work you should do with your computer is to make a DOS **backup diskette**. A backup diskette is a duplicate of another diskette.

Backup is very important. Diskettes can be damaged, and they wear out over time. If you do not keep backups, you may lose the information recorded on your diskettes.

When you use your application program, you will record your work on diskettes. Backing up these “working” diskettes is as important as backing up your system diskettes.

You use a **utility** to make a backup diskette. A utility is a program supplied with the DOS. Use the utilities DCOPY or SDCOPY to backup your system diskettes or your working diskettes. DCOPY is used with computers that have two floppy drives; SDCOPY is used with computers that have one floppy drive. DCOPY or SDCOPY (or, in some cases, both DCOPY and SDCOPY) are contained on the MS-DOS and CP/M-86 system diskettes.

It is also important to backup the information you store on the hard disk. You use the utilities ARCHIVE and SYSCOPY to backup the hard disk. The section in this guide on the hard disk operating system describes how to use ARCHIVE and SYSCOPY.

HOW TO BACKUP WITH DCOPY

3.1

Use DCOPY only if your computer has two floppy disk drives.

You need a new diskette to make a backup diskette. Be sure to use a double-sided diskette if the diskette you are copying is double-sided.

3.1.1 How To Backup a System Diskette With DCOPY

To backup a system diskette with DCOPY:

1. Load the DOS (if it is not already loaded).
2. Insert the new diskette in the right drive.
3. At the DOS command prompt, type:

dcopy

and press Return. If you make a mistake, correct it with the Backspace key or press Return and try again.

4. The DCOPY sign-on message appears at the top of the screen:

Diskette COPY Utility - Version n.n

At the bottom of the screen, DCOPY asks you:

Copy from FLOPPY drive? (A or B; press return key to end.) ■

5. With DCOPY, the left drive is drive A, and the right drive is drive B. Your system diskette should be in drive A. Type:

a

6. DCOPY tells you:

**Copy from FLOPPY drive A to FLOPPY drive B.
Press space bar when ready. ■**

7. Press the Space bar to start the copy. (Pressing any other key cancels the copy.)

8. During the copy, the number of the track being copied appears at the bottom of the screen. The number changes each time DCOPY moves to a new track. A track is a circular section of a diskette; diskettes have 80 tracks on a side.
9. DCOPY tells you when the copy is complete and asks if you want to repeat the process:

Copy from FLOPPY drive A to FLOPPY drive B complete.

Copy from FLOPPY drive? (A or B; press return key to end.) ■

10. Remove the backup diskette from drive B, label it, and store it.

CAUTION:

- ▶ Write on the label with a soft felt tip pen. DO NOT use a ball point or pencil.
 - ▶ Store diskettes away from magnetic fields generated by telephones, magnets, or other office equipment.
11. Repeat steps 5 through 10 to make another backup system diskette.
 12. Press Return to return to the DOS.

How To Backup Other Diskettes with DCOPY

3.1.2

To backup a diskette that does not contain the DOS:

1. Load the DOS with your system diskette.
2. Type:

dcopy

and press Return.

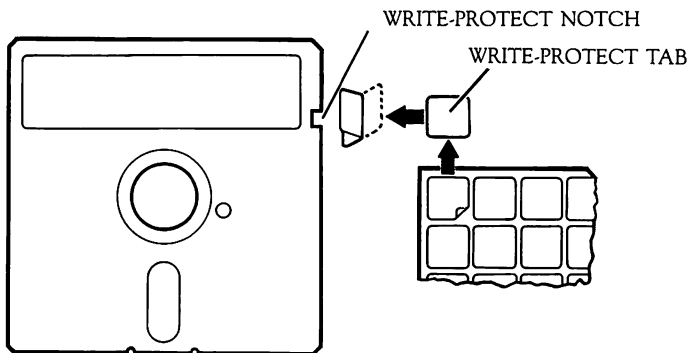
3. You no longer need your system diskette after the DCOPY sign-on message appears. Remove your system diskette and insert your working diskette in drive A.
4. Insert a new diskette in drive B.
5. Repeat steps 4 through 11 from the previous section.
6. To return to the DOS:
 - a. Remove your working diskette from drive A.
 - b. Insert your system diskette in drive A.
 - c. Press Return.

3.2 WRITE-PROTECTION FOR DISKETTES

After you backup the DOS, **write-protect** the backup diskette to safeguard the information on it. With **write-protection**, your computer cannot **write**—or record—over the information on a diskette.

Each diskette has a **write-protect notch** (Figure 3-1). To write-protect a diskette, cover the notch with an adhesive tab (Figure 3-1). Write-protect tabs are usually supplied with new diskettes.

3-1: Write-Protecting a Diskette



PREPARING NEW DISKETTES FOR USE (FORMAT)

The work you do with the computer is recorded on floppy diskettes or on the hard disk. Before you can record information on a floppy diskette, you must prepare it to accept data.

You use the utility **FORMAT** to prepare a diskette. You can use **FORMAT** with computers that have one or two floppy drives.

FORMAT is contained on the MS-DOS and the CP/M-86 system diskettes and can be used to format single- or double-sided diskettes. The MS-DOS version of **FORMAT** prepares diskettes for use with MS-DOS or with programs that use MS-DOS. The CP/M-86 version prepares diskettes for use with CP/M-86.

CAUTION: **FORMAT** erases information already recorded on the diskette being formatted. Be sure the diskette you format does not contain information you need.


This chapter describes basic use of **FORMAT**. You can expand **FORMAT**, as described later in the sections on the MS-DOS and CP/M-86 operating systems.

HOW TO USE FORMAT WITH TWO FLOPPY DISK DRIVES

4.1

To use **FORMAT** with two floppy drives:

1. Load the DOS (if it is not already loaded).
2. At the DOS command prompt:

- 
- ▶ If you are formatting a single-sided diskette, type:

format

and press the Return key.

- ▶ If you are formatting a double-sided diskette, type:

format /d

and press the Return key.

If you make a mistake, correct it with the Backspace key or press Return and try again.

3. The FORMAT sign-on message appears at the top of the screen:

Diskette FORMAT Utility - Version n.n



At the bottom of the screen, FORMAT asks you:

Format FLOPPY drive? (A or B; press return key to end.) ■

DO NOT RESPOND until step 5.

4. Insert the diskette to be formatted in the right drive.
5. With FORMAT, the right drive is drive B, and the left drive is drive A. The diskette to be formatted should now be in drive B. Type:

b

6. FORMAT tells you:

Format FLOPPY drive B. Press space bar when ready. ■



7. Press the Space bar to start the format. (Pressing any other key cancels the format.)
8. During the format, the number of the track being formatted appears at the bottom of the screen. The number changes each time FORMAT moves to a new track.

A track is a circular section of a diskette. Diskettes have 80 tracks on a side.

9. FORMAT tells you when it is done and asks you to repeat the process:

Format FLOPPY drive B complete.

Format FLOPPY drive? (A or B; press return key to end.) ■

10. Remove the formatted diskette from drive B and store it safely.
11. To format another diskette, repeat steps 4 through 10.
12. To return to the DOS, press Return.

HOW TO USE FORMAT WITH ONE FLOPPY DISK DRIVE

4.2

Use the procedure for formatting a diskette with two floppy drives EXCEPT THAT:

- ▶ At step 5, remove your system diskette from the drive and insert the diskette to be formatted. With FORMAT, the single drive is drive B.
- ▶ After you have finished using FORMAT, reinsert your system diskette and press Return to return to the DOS.

THE KEYBOARD

Your computer can be used with several different keyboard models. These keyboards are shown in Appendix D.

KEY LABELS

5.1

Key-top labels show shifted and unshifted key functions (Figure 5-1).

If the top label contains two words, the first word describes the shifted function, and the second word describes the unshifted function. If the top label contains three words, the second word identifies the function, the first word shows the shifted function, and the third word shows the unshifted function (Figure 5-1).

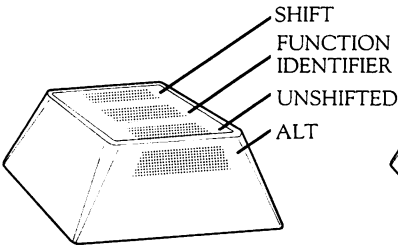
For example, the key labeled OFF/UNDL/ON is the underline key. When you press it unshifted, it turns on underline mode; everything that appears on the screen is underlined. When you press it while holding down the Shift key, it turns off underline mode. (NOTE: the underline mode is a temporary mode. It only affects what is on the screen. You cannot use it to print underlined words.)

Key-front labels show ALT (alternate) key functions (Figure 5-1). An ALT key function is done by pressing the key while holding down the ALT key.

Some key labels on some keyboards use symbols. Table 5-1 describes the symbol labels. (Your keyboard may not contain all the labels described in Table 5-1.)

5-1: Key Label Positions: Unshifted, Shifted, and ALT

KEY WITH 3-WORD TOP LABEL



KEY WITH 2-WORD TOP LABEL

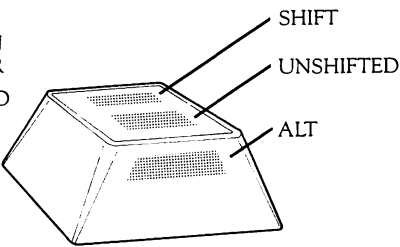


Table 5-1: Key-Label Symbols

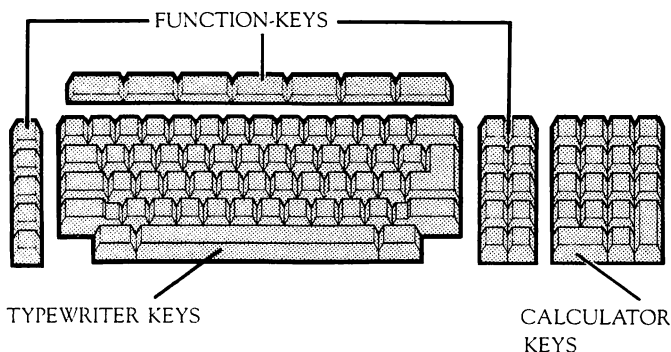
LABEL	FUNCTION
	Return
	Shift
	Shift lock/ lock release
	Backspace
	Tab right
	Cursor control
	Brightness control
	Contrast control
	Audio control

The keyboard is normally used as described below. However, the use of some keys varies from program to program. Refer to your program's user guide for specific key use.

The keyboard contains five main key groups (Figure 5-2): the **typewriter keys**, three groups of **function keys**, and the **calculator keys**.

5

5-2: Key Groups



The typewriter keys are used mainly as a typewriter. However, computers—unlike typewriters—are particular about receiving the correct character. Do not type lowercase L's for numeral 1's, or uppercase letter O's for zeros.

The two typewriter keys not found on a normal typewriter are the ALT key and the Pause or Pause/Cont key:

- ▶ The ALT key is always used with another key to perform ALT key functions. To do an ALT key function, hold down the ALT key and press the other key. Most ALT key functions are defined by the program in use.
- ▶ Use of the Pause key is defined by the program.

The top row of function keys are **general function keys**. Their use is defined by the program you are using.

The remaining function keys are **specific function keys**. They are intended to do what is shown on their labels. (Their use may also vary with the program you are using.)

5.3 HOW TO USE THE CALCULATOR

The calculator keys are for numeric entry or for use as a calculator. You can use the calculator keys to add, subtract, multiply, and divide.

You load the calculator program to use the calculator. Once the program is loaded, you can use it at any time. You can interrupt your work to perform a calculation and then return to your work exactly where you left off.

5.3.1 How To Load the Calculator Program

To load the calculator program:

1. Get to the DOS command prompt. (If you are using another program, refer to its user guide for instructions.)

2. Type:

calc

and press Return.

3. The DOS displays a message telling you it has installed (loaded) the calculator program.

Once you have loaded the calculator program, you turn it on to use it. You can turn on the calculator at any time.

How To Turn the Calculator On and Off

5.3.2

Turn on the calculator by pressing a shifted Calc (press the Calc key while holding down the Shift key). The Calc key is labeled CALC or MODE/CALC.

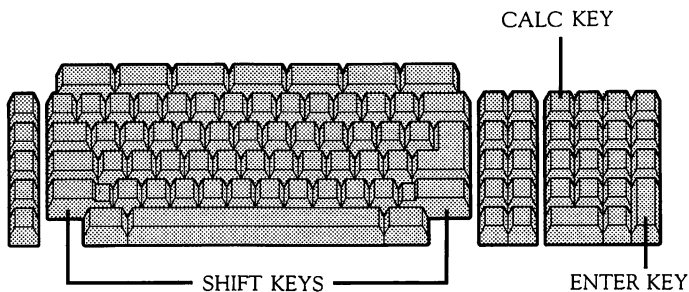
Turn off the calculator by:

- ▶ Pressing another shifted Calc or =.
- ▶ Pressing the Enter key.

Both keys return you to your work exactly where you left off. The Enter key, however, also places the result of your calculation in your work, as if you had typed the number without having used the calculator.

Figure 5-3 shows the Calc key, the Enter key, and the Shift keys.

5-3: Calc, Enter, and Shift Keys



start a new calculation after the first or second time you press the Calc key.

The following describes how to add, subtract, multiply, and divide with the calculator:

► Addition and subtraction:

- Type the numbers you are adding or subtracting in any order.
- Press the Add key (+) after each number you are adding.
- Press the Subtract key (−) after each number you are subtracting.
- Press the Calc key to complete the calculation.

► Multiplication:

- Type the numbers you are multiplying, pressing the Multiply key (×) after each one.
- Press the Calc key to complete the calculation.

► Division:

- Type the numbers you are dividing (in order), pressing the Divide key (÷) after each one.
- Press the Calc key to complete the calculation.

How To Correct Errors

5.3.4

You can use the Backspace key and the Calc key to correct errors.

Press the Backspace key to delete the last number you typed. Press the Calc key (one or more times) to cancel a calculation and return the calculator field to zero.

USING YOUR COMPUTER

You are now ready to start using application programs. To use an application program refer to the program's user guide. To use the DOS, refer to the section on MS-DOS or CP/M-86.

This chapter contains general information that applies to all programs. More detailed information can be found in the program user guides.

HARD DISK VOLUMES

6.1

The hard disk is divided into **volumes**. A volume is used much like a floppy drive with a diskette in it.

Each volume has a letter name, just like the floppy disk drives. The volumes are named when the hard disk is set up. (The program for setting up the hard disk is described in Appendix A.)

With a computer that has a hard disk, the floppy drive(s) are named when the volumes are named. The names of the drive(s) depend on how the hard disk is set up. (The floppy drives on a computer without a hard disk are always named A and B.)

The volume that contains the DOS is called the primary boot volume.

THE DEFAULT DRIVE OR VOLUME

6.2

The **default drive** is the floppy disk drive or hard disk volume you are now using. The default drive is also called the **logged** drive.

The default floppy drive name or volume name is always shown in the DOS command prompt. The prompt `A>` shows you that drive A is the default; `B>` shows you that drive B is the default.

You can move from one drive or volume to another. When you move to another floppy drive, it must contain a diskette. When you move to another hard disk volume, it must already have been set up.

To change the default while using the DOS, type the new drive or volume name, a colon (:), and press Return.

The following example shows moving from drive A to drive B and back to drive A. In the example, what you type is underlined, and (cr) represents the Return key.

```
A>b:(cr)
```

```
B>a:(cr)
```

```
A>
```

6.3 THE FILE SYSTEM

The computer stores information in **files**. These are similar to files in an office filing system. A file contains information, and each file has a name.

The user guide for an application program describes how to create and store files with that program.

6.3.1 The File Directory

Each diskette or virtual volume has a **file directory**. The file directory lists the files stored on the diskette or volume. Each time you create or delete a file, the computer adds it to or deletes it from the directory.

You can list the directory for your system diskette or hard disk volume. Get to the DOS command prompt and type:

dir

Then press Return. With MS-DOS, the DOS lists:

- ▶ Each file's name and extension (described in the next section).
- ▶ The number of bytes in each file.
- ▶ The date and time the file was created or last modified.

6

File Specifiers

6.3.2

Each file is named with a **file specifier**. The computer uses the file specifier to identify the file.

A file specifier has one to three parts:

- ▶ A **file name** that describes the file. A file name has up to 8 characters.
- ▶ An optional **file extension** that usually describes the file type. An extension has up to 3 characters.
- ▶ An optional **drive designation** (a drive name and a colon). The drive designation names the drive or volume containing the file.

The drive designation locates the file for the computer. If a file specifier does not contain a drive designation, the computer assumes the file is on the default drive.

The three parts are joined as follows:

D:FILENAME.EXT

where D: is the drive designation, and .EXT is the file extension.

Each application program's user guide describes how it uses file specifiers.

6.4 COMMUNICATING WITH THE COMPUTER

You type a command to tell the computer to do something. Commands can be typed in upper- or lowercase. End a command by pressing Return. Each program has its own set of commands.

The computer **reads** (retrieves) information from diskette or the hard disk or **writes** (records) information while processing commands. The in-use light by a floppy drive lights each time the computer uses the drive for a read or write operation. Never open the drive door while the in-use light is on.

Most commands can be modified with **command parameters**. A command parameter changes the effect of a command. For example, the DIR command (the DOS command for displaying the file directory) can be modified with a drive designation. If your computer has two floppy drives, both with diskettes in them, you can type:

dir b:

and press Return. The computer displays the directory for drive B, rather than for drive A. If drive B is empty, the computer displays an error message to indicate a problem.

6.5 LOADING PROGRAMS

You must load a program before you can use it. When you load a program, the computer transfers the information in the program from the diskette or volume that contains the program into the processor unit. This guide describes how to load the operating systems and their utilities. Each program's user guide describes how to load it. In general, you load a program by typing its name.

You can load a program that is not on the default drive by adding a drive designation to the program name. For example, if drive A is the default drive and the DCOPY program is on drive B, you can load DCOPY by typing:

b:dcopy

and pressing Return. When you finish using DCOPY, the computer returns you to drive A.

HOW TO CLEAN THE COMPUTER

6.6

6

Clean the computer cabinet with a soft cloth dampened with a mild household cleaner.

Clean the screen with the CRT Cleaning Cloth supplied with your computer. Do not use cleaning solution on the screen. If you do, residue from the solution will build up on the screen and obscure vision.

CAUTION:

- ▶ Never spray water or soap into the drives or onto the back of the processor.
- ▶ Never spray the screen with cleaning solution.
- ▶ Never poke anything at the screen.
- ▶ Never try to open the cabinet.

ENVIRONMENTAL AND ELECTRICAL REQUIREMENTS

6.7

Environmental requirements:

- ▶ 40–104 degrees Fahrenheit

- ▶ 5%–80% relative humidity

Be sure to keep the computer out of direct sunlight.

Electrical requirements:

- ▶ Voltage: U.S. and Canada—115 Volts AC
plus or minus 20% at 60Hz

International—220 Volts AC
plus or minus 20% at 50Hz

- ▶ Current: U.S. and Canada—2.0 Amp
International—1.0 Amp

SYSTEM STRUCTURE

The MS-DOS operating system provides a way for you to communicate with your computer. MS-DOS must be loaded for you to use the application programs that operate with MS-DOS. Like other operating systems, MS-DOS manages the basic functions used by these programs.

Chapters 7 through 9 describe how to use MS-DOS files, commands, and utilities. You can use MS-DOS commands or utilities whenever you are using the operating system. You know you are using the operating system when you see the DOS command prompt—a drive letter name followed by `>`. MS-DOS is the only operating system you can use with the hard disk (refer to Appendix A). This section describes the utilities for setting up and using the hard disk. It also describes the hard disk CP/M-86 emulator, which allows you to use the hard disk with programs based on CP/M-86.

SECTION CONVENTIONS

In examples, computer-generated material is shown in black and user entries are shown in gray. ■ represents the cursor.

In examples and command-format illustrations, `↵` represents the Return key, `␣` represents the Space bar, `ESC` represents the Escape key, and `^` represents the ALT key. Escape sequences and ALT sequences are hyphenated—for example, Escape S is shown as `ESC-S` and ALT C is shown as `ALT-C`.

In command formats, command names are in upper case, and command parameters are in lower case. (You may enter commands and command parameters in upper or lower case at the keyboard.)

In command formats, brackets ([]) indicate optional item(s). A vertical bar (|) separates alternatives. An ellipsis in brackets ([...]) indicates that the preceding parameter may be repeated. General forms appear as underlined single words or single-word abbreviations—such as filename, drivename, filespec, and ext.

The terms *system diskette* and *DOS diskette* refer to any diskette that contains the MS-DOS operating system.

7.2 SYSTEM RESOURCES

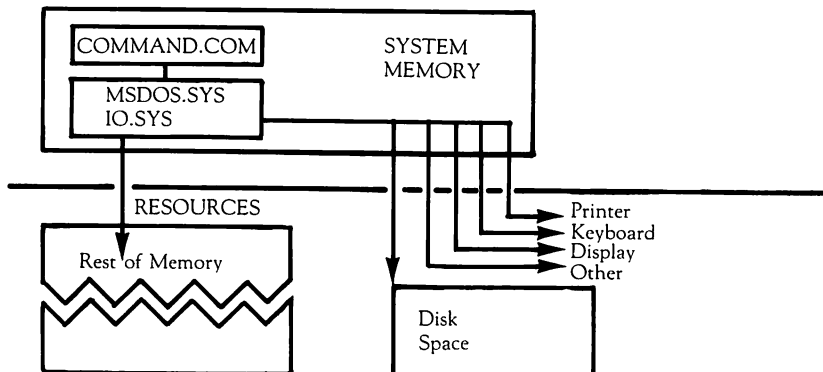
MS-DOS, itself, consists of three files:

COMMAND.COM
MSDOS.SYS
IO.SYS

These three files control all system resources. Note that MSDOS.SYS and IO.SYS are “hidden” files that are not displayed in the diskette file directory.

The relationship between these three files and system resources is shown in Figure 7-1.

7-1: MS-DOS and its Resources



The system's most important resources—its disk space and its memory—are described next.

Disk Space

7.2.1

In MS-DOS, disk space is divided into four parts:

- ▶ The reserved sectors contain information used each time MS-DOS is loaded.
- ▶ The directory contains information about each file on a given diskette. This information includes the file's complete file specifier (file specifiers are described in 7.3), its size, and its time and date of last modification.
- ▶ The file allocation table (FAT) contains location information for the data making up each file on a diskette.
- ▶ Files occupy the great majority of diskette space. An individual file does not necessarily reside in contiguous sectors on the diskette; its contents may be "scattered" on the diskette to decrease wasted memory space.

7

Memory

7.2.2

MS-DOS controls main memory as well as disk space and other devices. MS-DOS can load files into memory as data files or as executable files. The actual loading of files is performed by MSDOS.SYS, the lowest level of the MS-DOS operating system. COMMAND.COM supervises the loading of executable files.

Most well-designed programs return control to MS-DOS after normal or abnormal termination of the program.

Part of COMMAND.COM may be overlaid to make room for a particularly large executable file. After such a file is executed, MS-DOS automatically loads the overlaid part of COMMAND.COM back into system memory, and normal execution of COMMAND.COM resumes. COMMAND will attempt to reload the transient portion from the default drive at startup, not from the current default drive. If COMMAND does not exist on

the start-up default drive, the recovery process allows specification of a new COMMAND.COM drive. This drive will be used for this and subsequent reloads of the transient portion.

If MS-DOS finds an incorrect version of COMMAND.COM when it attempts to load the overlaid section, it displays a similar message:

Invalid COMMAND.COM
Insert DOS disk in default drive
and strike any key when ready

7.3 THE FILE SYSTEM

MS-DOS stores information on diskettes in the form of files; a file is one or a group of related characters. A single file can be any length, up to the data storage capacity of a diskette (600 Kbytes per side).

The file system may be thought of as the external organization of system resources. MS-DOS supports "device independent I/O," which means that the distinction between files and devices is internal only. Therefore, you can treat devices as files and refer to either with "file specifiers" (as described below).

7.3.1 File Specifiers

A file is identified by its file specifier. A file specifier consists of one to three parts: a file name and (optionally) a file extension and/or a drive designation. If the drive designation is omitted from a file specifier, MS-DOS assumes that the file is on the diskette in the default drive.

The three parts of a file specifier are illustrated in Figure 7-2.